This document is scheduled to be published in the
Federal Register on 05/02/2013 and available online at
http://federalregister.gov/a/2013-10388, and on FDsys.gov

[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket Number EERE-2013-BT-STD-0021]

Energy Conservation Program for Certain Industrial Equipment: Energy Conservation Standards for Commercial Warm Air Furnaces

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Request for information (RFI).

SUMMARY: The U.S. Department of Energy (DOE) is initiating a rulemaking to consider amended energy conservation standards for commercial warm air furnaces. Once completed, this rulemaking will fulfill DOE's statutory obligation by December 31, 2013 to either propose amended energy conservation standards for warm air furnaces or to make a determination that the existing standards do not need to be amended. This notice seeks to solicit information to assist DOE in determining whether national standards more stringent than those that are currently in place would result in a significant amount of additional energy savings and whether such amended national standards would be technologically feasible and economically justified. In overview, this document presents a brief description of the analysis DOE plans to perform for this rulemaking and requests comment on various issues relating to each of the analyses (*e.g.*, market assessment, engineering analysis, energy use analysis, life-cycle cost and payback period analysis, and national impact analysis). Although this document contains numerous specific

topics on which the Department is particularly interested in receiving written comment, DOE welcomes views and information from the public on any subject within the scope of this rulemaking (including relevant matters not specifically raised in this RFI).

DATES: Written comments and information are requested on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Interested parties are encouraged to submit comments electronically. However, interested persons may submit comments, identified by docket number EERE-2013-BT-STD-0021, or by any of the following methods:

- Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
- E-mail: CommWarmAirFurn2013STD0021@ee.doe.gov. Include docket number EERE-2013-BT-STD-0021in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-2J, 1000 Independence Avenue, SW., Washington, DC 20585-0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
- Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD, in which case it

is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section III of this document (Public Participation).

FOR FURTHER INFORMATION CONTACT: Requests for additional information may be sent to Mr. John Cymbalsky, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 286–1692. E-mail: commercial_furnaces@ee.doe.gov.

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC–71, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-9507. E-mail: Eric.Stas@hq.doe.gov.

For information on how to submit or review public comments, contact Ms. Brenda Edwards, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Mailstop EE-2J, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-2945. E-mail: Brenda.Edwards@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction

A. Authority

Title III, Part C[1] of the Energy Policy and Conservation Act of 1975 (EPCA or the Act), Pub. L. 94-163 (42 U.S.C. 6311-6317, as codified), added by Pub. L. 95-619, Title IV, §441(a), established the Energy Conservation Program for Certain Industrial Equipment, which includes provisions covering the commercial warm air furnace equipment that is the subject of this notice.[2] In general, this program addresses the energy efficiency of certain types of commercial and industrial equipment. Relevant provisions of the Act specifically include definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314), labelling provisions (42 U.S.C. 6315), and the authority to require information and reports from manufacturers (42 U.S.C. 6316).

The initial Federal energy conservation standards for commercial warm air furnaces were added to EPCA by the Energy Policy Act of 1992 (EPACT 1992), Pub. L. 102-486. (42 U.S.C.

[1] For editorial reasons, upon codification in the U.S. Code, Part C was re-designated Part A-1.
[2] All references to EPCA in this document refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act, Pub. L. 112-210 (Dec. 18, 2012).

6313(a)(4)) These types of covered equipment have a rated capacity (rated maximum input) greater than or equal to 225,000 Btu/h, can be gas-fired or oil-fired, and are designed to heat commercial buildings. Id.

Section 5(b) of the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012), amended EPCA to include a requirement for DOE to consider amending the standards for certain types of commercial and industrial equipment[3] every six years, as well as a mandate that DOE must conduct an expedited rulemaking to consider amended energy conservation standards for any covered equipment of those types for which more than 6 years has elapsed since the issuance of the most recent final rule establishing or amending a standard for the product as of the date of AEMTCA's enactment (i.e., December 18, 2012). (42 U.S.C. 6313(a)(6)(C)(i) and (vi)[4]) In general, when conducting such a review, DOE must publish either: (1) a notice of determination that the current standards do not need to be amended, or (2) a notice of proposed rulemaking containing proposed standards; however, for those types of equipment for which more than six years has passed since the last final rule, Congress also set a deadline of December 31, 2013 for publication of the determination/proposed rule. Id.

In order to meet the new requirements added by AEMTCA, DOE has begun to review its existing energy conservation standards for those equipment types listed in 42 U.S.C. 6313(a) for which at least six years have elapsed since issuance of the most recent final rule, including the commercial warm air furnaces that are the subject of this notice.

[3] These equipment types include small, large, and very large commercial package air-conditioning and heating equipment, packaged terminal air conditioners and heat pumps, warm air furnaces, packaged boilers, storage water heaters, instantaneous water heaters, or unfired hot water storage tanks ("ASHRAE equipment").

[4] It is noted the AEMTCA inadvertently assigned two separate provisions to 42 U.S.C. 6313(a)(6)(C)(vi). The provision cited above is the one most relevant to this RFI.

Today's notice represents the initiation of the mandatory review process required by AEMTCA and seeks input from the public to assist DOE with its evaluation of whether to amend the current Federal energy conservation standards for commercial warm air furnaces. In making this determination, DOE must evaluate whether there is clear and convincing evidence that more-stringent national standards would result in significant additional energy savings, and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) In determining whether an amended energy conservation standard is economically justified, the Secretary shall, after receiving views and comments furnished with respect to a proposed standard, determine whether the benefits of the standard exceed the burden of the proposed standard by, to the maximum extent practicable, considering the following seven factors:

(1) The economic impact of the standard on the manufacturers and on the consumers of the products subject to the standard;

(2) The savings in operating costs throughout the estimated average life of the product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the products that are likely to result from the standard;

(3) The total projected quantity of energy savings likely to result directly from the standard;

(4) Any lessening of the utility or the performance of the products likely to result from the standard;

(5) The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the standard;

(6) The need for national energy conservation; and

(7) Other factors the Secretary considers relevant.

(42 U.S.C. 6313(a)(6)(B)(ii))

EPCA, as codified, also contains what is known as an "anti-backsliding" provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6295(o)(1)) Also, the Secretary may not prescribe an amended or new standard if interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States. (42 U.S.C. 6295(o)(4))

Further, EPCA, as codified, establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that the additional cost to the customer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy (and, as applicable, water) savings during the first year that the consumer will receive as a result of the standard, as calculated under the applicable test procedure. (42 U.S.C. 6295(o)(2)(B)(iii))

Additionally, when a type or class of covered equipment has two or more subcategories, DOE often specifies more than one standard level. DOE generally will adopt a different standard level than that which applies generally to such type or class of products for any group of covered

products that have the same function or intended use if DOE determines that products within such group: (A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a capacity or other performance-related feature which other products within such type (or class) do not have and which justifies a higher or lower standard. (42 U.S.C. 6295(q)(1)) In determining whether a performance-related feature justifies a different standard for a group of products, DOE generally considers such factors as the utility to the customer of the feature and other factors DOE deems appropriate. In a rule prescribing such a standard, DOE includes an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6295(q)(2)) DOE followed a similar process in the context of today's rulemaking.

Federal energy conservation requirements generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c)) DOE may, however, grant waivers of Federal pre-emption for particular State laws or regulations, in accordance with the procedures and other provisions set forth under 42 U.S.C. 6297(d).

B. Background

As noted above, the current energy conservation standards for commercial warm air furnaces were set by EPACT 1992. On October 21, 2004, DOE published a final rule in the Federal Register which adopted definitions for "commercial warm air furnace" and "thermal efficiency," promulgated test procedures for this equipment, and recodified the energy conservation standards so that the standards are located contiguous with the test procedures in the Code of Federal Regulations (CFR). 69 FR 61916, 61917. In the same final rule, DOE incorporated by reference (see § 431.75) a number of industry test standards relevant to

commercial warm air furnaces, including American National Standards Institute (ANSI) Standard Z21.47-1998, "Gas-Fired Central Furnaces," for gas-fired furnaces, Underwriters Laboratories (UL) Standard 727-1994, "Standard for Safety for Oil-Fired Central Furnaces," for oil-fired furnaces, provisions from Hydronics Institute (HI) Standard BTS-2000, "Method to Determine Efficiency of Commercial Space Heating Boilers," to calculate flue loss for oil-fired furnaces, and the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 103-1993, "Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers," to determine the incremental efficiency of condensing furnaces under steady-state conditions. Id. Then in a final rule published in the Federal Register on May 16, 2012, DOE updated the test procedures for commercial warm air furnaces to match the procedures specified in ASHRAE Standard 90.1-2010, which referenced ANSI Z21.47-2006, "Gas-Fired Central Furnaces," for gas-fired furnaces and UL 727-2006, "Standard for Safety for Oil-Fired Central Furnaces," for oil-fired furnaces. 77 FR 28928, 28987-88. The current Federal energy conservation standards, for this equipment are shown in Table 1.

Table 1. Minimum Heating Efficiency Levels for Commercial Warm Air Furnaces

Equipment Type	Input Capacity	Minimum Thermal Efficiency Level*	Compliance Date
Gas-fired Commercial Warm Air Furnace	≥225,000 Btu/h	80%	1/1/1994
Oil-fired Commercial Warm Air Furnace	≥225,000 Btu/h	81%	1/1/1994

*At the maximum rated capacity (rated maximum input).

C. Rulemaking Process

DOE generally follows specific criteria when prescribing amended standards for covered "ASHRAE equipment." (See generally 42 U.S.C. 6313(a)(6)(A)–(C).) When proposing to

adopt more-stringent standard levels than those contained in ASHRAE Standard 90.1, DOE must evaluate whether clear and convincing evidence exists demonstrating that such amended standards would be technologically feasible and would result in significant additional energy savings, and then must consider whether amended standards are economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II))

In assessing the appropriateness of amending the standards that are currently in place for commercial warm air furnaces, DOE plans to conduct its analyses in stages, with a positive result leading to a subsequent stage of the analysis. Under this approach, DOE would first evaluate whether more-stringent standards are technologically feasible and would lead to significant additional energy savings. If either of these prongs is not met, DOE would conduct no further analysis, because the statutory criteria for adoption of the more-stringent standard could not be met. However, if this initial assessment is positive, DOE plans to conduct in-depth analyses of the costs and benefits of the potential amended standards to determine whether such amended standards would be economically justified. The analyses would include the following steps: (1) engineering; (2) energy use; (3) markups; (4) life-cycle cost and payback period; and (5) national impacts. If, after conducting those analyses, DOE reasons that there is a high likelihood that more-stringent standards would be economically justified, DOE will conduct downstream analyses including an analysis of: (1) manufacturer impacts; (2) emission impacts; (3) utility impacts; (4) employment impacts; and (5) regulatory impacts. These analyses are the same ones DOE routinely applies when evaluating potential energy conservation standards for a given type of product or equipment. DOE will also conduct several other analyses that support those previously listed, including the market and technology assessment, the screening analysis (which contributes to the engineering analysis), and the shipments analysis (which contributes to the

national impact analysis). As detailed throughout this RFI, DOE is publishing this notice as the first step in the analytical process and is specifically requesting input and data from interested parties to aid in the development of the technical analyses.

Due to the relatively short timeline for this rulemaking set forth by AEMTCA, DOE anticipates moving from this RFI directly to publication of either a determination that the commercial warm air furnaces standards do not need to be amended or a notice of proposed rulemaking for amended standards by the December 31, 2013 deadline.

II. Planned Rulemaking Analyses

In this section, DOE identifies a variety of issues on which it seeks input and data in order to aid its development of the technical and economic analyses to determine whether amended energy conservation standards may be warranted. In addition, DOE welcomes comments on other issues relevant to this rulemaking that may not specifically be identified in this notice.

A. Market Assessment

The market and technology assessment provides information about the commercial warm air furnace industry that will be used throughout the rulemaking process. For example, this information will be used to determine whether the existing equipment class structure requires modification based on the statutory criteria for setting such classes and to explore the potential for technological improvements in the design and manufacturing of such equipment. The Department uses qualitative and quantitative information to assess the past and present industry structure and market characteristics. For this rulemaking, DOE will use existing market materials and literature from a variety of sources, including industry publications, trade journals,

government agencies, and the AHRI Directory of Certified Product Performance.[5] Additionally, DOE will consider conducting interviews with manufacturers to assess the overall market for commercial warm air furnaces.

The current standards for commercial warm air furnaces are specified for two equipment classes which are characterized by fuel type – (1) gas-fired commercial warm air furnaces with capacity of 225,000 Btu per hour or more and (2) oil-fired commercial warm air furnaces with capacity of 225,000 Btu per hour or more. As a starting point, DOE plans to use the existing equipment class structure. However, DOE will consider additional equipment classes for capacities or other performance-related features that inherently effect efficiency and justify the establishment of a different energy conservation standard. For instance, DOE may consider adopting equipment classes to differentiate between weatherized and non-weatherized commercial warm air furnaces, or DOE might also consider creating an equipment class for three-phase equipment with an input capacity less than 225,000 Btu/h. Each of these potential new equipment classes, and the rationale therefore, are discussed immediately below.

1. Potential New Product Classes

a. Weatherized and Non-weatherized Commercial Furnaces

Based on a preliminary review of the commercial furnace market, DOE understands that almost all commercial warm air furnaces are installed outdoors on rooftops, but there is a very small segment of the commercial warm air furnace market that consists of units installed indoors. These indoor commercial warm air furnace models appear to consist of all the oil-fired furnace models on the market and a few gas-fired furnace models. One of the indoor gas-fired model

[5] The AHRI Directory can be found at: http://www.ahridirectory.org/ahridirectory/pages/home.aspx (Last accessed on April 11, 2013).

lines utilizes condensing heat exchanger technology to achieve a thermal efficiency of 90 percent.

Installation location (i.e., indoors or outdoors) is significant, because it relates to the risk of condensate freezing. If the outdoor ambient temperature falls below freezing, the condensate can freeze and cause a backflow of condensate into the furnace's internal components and damage them. Although use of condensing technology may be possible in outdoor weatherized furnaces (see section II.B.1 for further discussion), condensing, non-weatherized heat exchanger technology has been demonstrated as technologically feasible for indoor applications in both the residential and commercial furnace markets. Condensing heat exchanger technology is easier to employ on non-weatherized furnaces, because they are installed indoors and there is little to no risk of condensate freezing since the appliance will be installed in or adjacent to a conditioned space. Even indoor furnaces installed in non-conditioned spaces have minimal chances of freezing in comparison to units that are completely outdoors, because they can be insulated from outdoor conditions. Thus, if indoor, non-weatherized commercial warm air furnace units were separated from outdoor, weatherized units in a new equipment class, there would be the potential for additional energy savings by utilizing condensing heat exchanger technology. Consequently, DOE has tentatively concluded that this is a performance-related feature that may justify separate equipment classes for these types of equipment.

Issue 1: DOE requests comment on the potential energy savings in creating a separate equipment classes for non-weatherized, indoor commercial warm air furnaces and weatherized, outdoor commercial warm air furnaces. DOE is also interested in

learning about existing equipment that fall into this potential equipment class, as well as the market penetration of such equipment.

b. Three-phase Equipment with an Input Capacity Less Than 225,000 Btu/h

EPCA defines a commercial "warm air furnace" as "a self-contained oil- or gas-fired furnace designed to supply heated air through ducts to spaces that require it and includes combination warm air furnace/electric air conditioning units but does not include unit heaters and duct furnaces." (42 U.S.C. 6311(11)(A)) DOE notes that EPCA itself does not place a limit on the input capacity, specify a current phase type (single-phase or three-phase), or include any other similar criteria in the statutory definition that would restrict the scope of commercial warm air furnaces as covered equipment. However, when promulgating EPCA's initial energy conservation standards for commercial warm air furnaces, Congress only included energy conservation standards for commercial warm air furnaces with input ratings of 225,000 Btu/h or more. In light of the above, when establishing its regulations for commercial warm air furnaces in the CFR, DOE reiterated EPCA's definition of a "warm air furnace" and further defined a "commercial warm air furnace" as "a warm air furnace that is industrial equipment, and that has a capacity (rated maximum input) of 225,000 Btu per hour or more" at 10 CFR 431.72. However, DOE is open to considering energy conservation standards for commercial warm air furnaces of different capacities as part of this rulemaking to consider amended standards.

EPCA and the CFR define a residential "furnace" as "a product which utilizes only single-phase electric current, or single-phase electric current or DC current in conjunction with natural gas, propane, or home heating oil, and which –

(a) is designed to be the principal heating source for the living space of a residence;

(b) is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu per hour;

(c) is an electric central furnace, electric boiler, forced-air central furnace, gravity central furnace, or low pressure steam or hot water boiler; and

(d) has a heat input rate of less than 300,000 Btu per hour for electric boilers and low pressure steam or hot water boilers and less than 225,000 Btu per hour for forced-air central furnaces, gravity central furnaces, and electric central furnaces, gravity central furnaces, and electric central furnaces."

(42 U.S.C 6291(23); 10 CFR 430.2)

Currently, DOE has promulgated energy conservation standards for commercial warm air furnaces (single-phase or three-phase) with an input greater than or equal 225,000 Btu/h (10 CFR 431.77), as well as standards for residential (single-phase) furnaces with an input less than 225,000 Btu/h (10 CFR 430.32(e)). Thus, there are presently no energy conservation standards for commercial three-phase warm air furnaces with an input capacity less than 225,000 Btu/h.

Commercial warm air furnaces are "ASHRAE equipment," for which EPCA requires that DOE maintain efficiency standards at the efficiency levels set in ASHRAE Standard 90.1 or more-stringent levels. (42 U.S.C. 6313(a)(6)(A)) That is, if ASHRAE amends any efficiency level with respect to the equipment in ASHRAE Standard 90.1, DOE must either adopt that efficiency level or determine, with the support of clear and convincing evidence, that a more-stringent standard is warranted. Id. ASHRAE Standard 90.1-2010 lists efficiency levels for three-phase warm air furnaces in Table 6.8.1E, including for those with an input capacity less than 225,000 Btu/h. However, ASHRAE sets the efficiency level for warm air furnaces with an

input capacity less than 225,000 Btu/h as a choice between 78 percent AFUE or 80 percent thermal efficiency for units that are not covered by DOE's standards for residential furnaces. The 78 percent AFUE rating is the current Federal efficiency standard for residential furnaces, and the 80 percent thermal efficiency rating is the current Federal efficiency standard for commercial gas-fired warm air furnaces.

Some residential furnace manufacturers offer both single-phase and three-phase versions of their furnaces, which appear (based on a review of product literature) to be otherwise exactly the same. Based on a review of market data, DOE notes that these three-phase furnaces are typically weatherized (i.e., outdoor) units that generally have the same efficiency as their single-phase counterpart. In other cases, especially for three-phase furnaces paired with rooftop air-conditioning units with a cooling capacity greater than 5 tons, there are no single-phase counterparts. However, all of these models have a thermal efficiency of at least 80 percent, meeting or exceeding the current Federal efficiency standards for commercial warm air furnaces.

DOE notes that this rulemaking presents somewhat unique circumstances, namely where ASHRAE in the past had acted to adopt standards in ASHRAE Standard 90.1 for commercial warm air furnaces with an input capacity less than 225,000 Btu/h but DOE did not consider itself triggered at that time. The new statutory 6-year look-back review provisions for ASHRAE equipment (as codified at 42 U.S.C. 6313(a)(6)(C)(i) and (vi)) direct DOE to evaluate amended standards, assuming that DOE has already been triggered and set a standard at a level no less than the ASHRAE level for the equipment in question. In this case, if DOE does not find that clear and convincing evidence exists to support adoption of a more-stringent standard, DOE will

adopt one of the standard levels in ASHRAE Standard 90.1 as the Federal standard (AFUE or thermal efficiency).

Issue 2: DOE requests comment on the need to establish an equipment class for three-phase commercial warm air furnaces with an input capacity less than 225,000 Btu/h and the potential energy savings that could be achieved from creating such an equipment class.

Issue 3: DOE also requests comment on whether AFUE or thermal efficiency is an appropriate efficiency metric for three-phase commercial warm air furnaces with an input capacity less than 225,000 Btu/h,

B. Engineering Analysis

The engineering analysis estimates the cost-efficiency relationship of equipment at different levels of increased energy efficiency. This relationship serves as the basis for the cost-benefit calculations for commercial customers, manufacturers, and the Nation. In determining the cost-efficiency relationship, DOE will estimate the increase in manufacturer cost associated with increasing the efficiency of equipment above the baseline at various efficiency levels up to the maximum technologically feasible ("max-tech") efficiency level for each equipment class. The baseline model is used as a reference point for each equipment class in the engineering analysis and the life-cycle cost and payback-period analyses. Typically, DOE would consider equipment that just meets the minimum energy conservation standard as baseline equipment. The vast majority of commercial warm air furnaces on the market achieve thermal efficiency ratings between 80 percent (the minimum efficiency standard) and 82 percent, inclusively, with two model lines achieving a thermal efficiency rating of 90 percent. In this engineering analysis,

DOE is planning on analyzing the technology options and cost for equipment at 80 percent, 82 percent, and 90 percent thermal efficiencies.

Issue 4: DOE requests information on max-tech efficiency levels achievable in the current market.

Issue 5: DOE requests feedback on its proposed efficiency levels for analysis.

Issue 6: DOE requests information regarding the technology differences between commercial furnaces at 80 percent thermal efficiency ratings and more-efficient commercial furnaces.

In order to determine the cost-efficiency relationship, DOE anticipates drawing upon a variety of resources. DOE will use knowledge gained from previous rulemakings for similar equipment and consult manufacturers, technical experts, and product literature to estimate the cost of equipment with increased efficiency. DOE may also use reverse-engineering (or cost-assessment) techniques that include teardown analysis to assist in determining the cost-efficiency relationship. A teardown analysis (or "physical teardown") determines the production cost of a piece of equipment by disassembling the equipment ''piece-by-piece'' and estimating the material and labor cost of each component. The information from teardowns is then inputted into a cost model which fully accounts for labor, material, overhead, and depreciation to develop an estimate of the total manufacturer production cost (MPC). A supplementary method called a catalog teardown (or "virtual teardown") uses published manufacturer catalogs and supplementary component data to estimate the major physical differences between a piece of equipment that has been physically disassembled and another piece of similar equipment. These

two methods could be used individually or in combination to help DOE determine the cost-efficiency relationship for commercial warm air furnaces. If DOE finds that sufficient information exists, based on previous analyses of similar products and in manufacturer literature and information, to estimate the costs using virtual teardowns in lieu of physical teardowns, DOE may choose to use only virtual teardowns, an approach which would yield the necessary information while saving time and resources.

Issue 7: DOE requests feedback on the possible approaches identified for the engineering analysis and on what the appropriate representative capacities and characteristics would be for each equipment class.

1. Condensing Weatherized Commercial Warm Air Furnaces

As briefly discussed in section II.A.1.a above, furnaces that utilize condensing heat exchanger technology extract more useable heat from the flue gas via a secondary heat exchanger. This extra heat extraction can cause water vapor to condense from the gas, hence the term "condensing furnace." This technology has not become established in the commercial warm air furnace market because of challenges associated with removing acidic condensate from units installed outdoors, which is the majority of the commercial warm air furnace market. When the outdoor ambient temperature falls below freezing, the condensate leaving the drain pipe can freeze and cause a backflow of condensate into the furnace's internal components which can permanently damage the furnace, creating reliability issues. If the furnace becomes disabled while the outdoor ambient temperatures are below freezing and if the furnace is not repaired or replaced in a timely fashion, there could be a danger to building occupants due to exposure to

low temperatures. Also, because this condensate is acidic, it may need to be treated with a neutralizer before discharging it into a sewer system, according to some local codes.

In researching the potential for rooftop condensate disposal methods, DOE identified two patents from major manufacturers that provided methods for condensate disposal in outdoor furnaces. DOE is also aware of one manufacturer that markets a dedicated outdoor air system with an optional heating section that utilizes a condensing heat exchanger to achieve a thermal efficiency over 90 percent, and which drains the condensate into the heated building space to prevent condensate freezing. The manufacturer also recommends completely draining the condensate drain system and secondary heat exchanger or applying heat tape to the drain system in order to prevent condensate freezing. DOE tentatively plans to examine condensing heat exchangers as a viable technology option for improving the thermal efficiency of commercial furnaces and analyze it as part of the engineering analysis.

Issue 8: DOE requests comment on the feasibility of using condensing heat exchanger technology in weatherized commercial warm air furnaces. DOE is also interested in comments on issues related to implementing identified condensing heat exchanger technologies in outdoor warm air furnaces, as well as costs associated with implementing a condensate drain into the building's space.

C. Markups Analysis

To carry out the life-cycle cost (LCC) and payback period (PBP) calculations, DOE needs to determine the cost to the commercial customer of baseline equipment that satisfies the currently applicable standards, and the cost of the more-efficient unit the customer would

purchase under potential amended standards. This is done by applying a markup multiplier to the manufacturer's selling price to estimate the commercial customer's price.

DOE intends to characterize several types of distribution channels to describe how the equipment passes from the manufacturer to the customer. The first distribution channel is characterized as follows:

Manufacturer → Wholesaler → Mechanical contractor → General contractor → Consumer

In the second distribution channel, the manufacturer sells the equipment directly to the customer through a national account, which is characterized as follows:

Manufacturer → Consumer

In addition, DOE plans to consider cases when the contractor's sale of the equipment includes a start-up/check-out contract, in which cases the equipment markup is included in the contract costs.

Issue 9: DOE seeks input from stakeholders on whether the distribution channels described above are relevant for commercial warm air furnaces.

Issue 10: DOE seeks input on the percentage of equipment being distributed through the various types of distribution channels, and whether the share of equipment through each channel varies based on equipment capacity.

To develop markups for the parties involved in the distribution of the equipment, DOE utilized several sources including: (1) the Heating, Air-Conditioning & Refrigeration Distributors International (HARDI) 2012 Profit Report[6] to develop wholesaler markups, (2) the 2005 Air Conditioning Contractors of America's (ACCA) financial analysis for the heating, ventilation, air-conditioning, and refrigeration (HVACR) contracting industry[7] to develop mechanical contractor markups, and (3) U.S. Census Bureau's 2007 Economic Census data[8] for the commercial and institutional building construction industry to develop general contractor markups.

Issue 11: DOE seeks recent data to establish the markups for the parties involved with the distribution of the equipment.

D. Energy Use Analysis

The purpose of the energy use analysis is to assess the energy requirements of equipment at different efficiencies in several building types that utilize the equipment. DOE intends to base the energy use analysis for the current effort on building simulation data or bin method. The building simulation will include building operation hourly profiles, which are based on building characteristics from the Energy Information Administration's 2003 Commercial Building Energy Consumption Survey (CBECS)[9] for the subset that uses the type of equipment covered by the standards. Each building will be assigned to a specific location, and the approach will capture

[6] *Heating, Air Conditioning & Refrigeration Distributors International 2012 Profit Report* (Available at: http://www.hardinet.org/Profit-Report) (Last accessed April 10,2013).
[7] Air Conditioning Contractors of America (ACCA), *Financial Analysis for the HVACR Contracting Industry: 2005* (2005) (Available at: https://http://www.acca.org/store/product.php?pid=142) (Last accessed April 10, 2013).
[8] U.S. Census Bureau, *2007 Economic Census Data* (2007) (Available at: http://www.census.gov/econ/) (Last accessed April 10, 2013).
[9] Energy Information Administration (EIA), 2003 Commercial Building Energy Consumption Survey (CBECS) (Available at: http://www.eia.gov/consumption/commercial/) (Last accessed April 10, 2013).

variability in heating loads due to factors such as building activity, schedule, occupancy, local weather, and shell characteristics.

CBECS 2012 is currently in development but will not be available in time for this rulemaking. In addition, the 2003 CBECS sample may not include examples of recent innovations in building shell or window technologies that reduce cooling loads. Therefore, DOE intends on reviewing other data sets (*e.g.*, the technology penetration curves used in the latest National Energy Modeling System (NEMS)[10]), to determine whether a significant fraction of the current building population is not represented by CBECS 2003.

Issue 12: DOE requests comment or seeks input from stakeholders on the overall method to determine the equipment load profiles;

Issue 13: DOE requests comment or seeks input from stakeholders on the current distribution of equipment efficiencies in the building population;

Issue 14: DOE requests comment or seeks input from stakeholders on how equipment energy use for a given heating load shape scales as a function of capacity (i.e., whether two commercial furnace units of a certain capacity use the same total heating energy as one commercial furnace unit of twice the capacity)

[10] For more information on NEMS, refer to the U.S. Department of Energy, Energy Information Administration (EIA) documentation. A useful summary is *National Energy Modeling System: An Overview 2003*, DOE/EIA-0581(2003). Each year, EIA uses NEMS to produce an energy forecast for the United States, the Annual Energy Outlook (AEO). For this analysis, DOE intends to use the version of NEMS based on *AEO 2013* (Available at: http://www.eia.gov/forecasts/aeo/).

Issue 15: DOE requests comment or seeks input from stakeholders on whether building simulations developed for small and large commercial furnace equipment are applicable to very large equipment, and

Issue 16: DOE requests comment on the fraction of commercial warm air furnaces which are used in residential applications such as residential multi-family buildings as well as the fraction of residential furnaces that are used for commercial applications.

E. Life-Cycle Cost and Payback Period Analysis

The purpose of the LCC and PBP analysis is to analyze the effects of potential amended energy conservation standards on customers of commercial furnace equipment by determining how a potential amended standard affects their operating expenses (usually decreased) and their total installed costs (usually increased).

DOE intends to analyze the potential for variability and uncertainty by performing the LCC and PBP calculations on a representative sample of individual commercial buildings. DOE plans to utilize the sample of buildings developed for the energy use analysis[11] and the corresponding simulations results. Within a given building, one or more commercial furnace units may serve the building's space-conditioning needs, depending on the heating load requirements of the building. As a result, the Department intends to express the LCC and PBP results as the number of commercial furnace customers experiencing economic impacts of different magnitudes. DOE plans to model both the uncertainty and the variability in the inputs

[11] DOE plans to utilize the building types defined in CBECS 2003. Definitions of CBECS building types can be found at http://www.eia.gov/emeu/cbecs/building_types.html.

to the LCC and PBP analysis using Monte Carlo simulation and probability distributions. As a result, the LCC and PBP results will be displayed as distributions of impacts compared to the base case conditions.

Issue 17: DOE requests comment from stakeholders on the overall method that it intends on using to conduct the LCC and PBP analysis for commercial warm air furnaces.

Inputs to the LCC and PBP analysis are categorized as: (1) inputs for establishing the purchase expense, otherwise known as the total installed cost, and (2) inputs for calculating the operating expense.

The primary inputs for establishing the total installed cost are the baseline customer price, standard-level customer price increases, and installation costs. Baseline customer prices and standard-level customer price increases will be determined by applying markups to manufacturer price estimates. The installation cost is added to the customer price to arrive at a total installed cost. DOE intends to develop installation costs for commercial warm air furnaces using the most recent RS Means data available.

Issue 18: DOE seeks input on the approach and data sources it intends to use to develop installation costs, specifically, its intention to use the most recent RS Means Mechanical Cost Data.[12]

The primary inputs for calculating the operating costs are equipment energy consumption and power demand, equipment efficiency, electricity prices and forecasts, maintenance and

[12] RS Means, 2013 Mechanical Cost Data (Available at: http://rsmeans.reedconstructiondata.com/60023.aspx) (Last accessed April 10, 2013).

repair costs, equipment lifetime, and discount rates. Both equipment lifetime and discount rates are used to calculate the present value of future operating expenses.

The equipment energy consumption is the site energy use associated with providing space-heating to the building. DOE intends to utilize calculation methodology to establish equipment energy use.

DOE intends to determine gas, oil, and electricity prices based on recent or current tariffs from a representative sample of utilities, as well as historical State commercial energy price data from the Energy Information Administration (EIA). This approach calculates energy expenses based on actual energy prices that customers are paying in different geographical areas of the country. In addition to using tariffs, DOE plans to use data provided in EIA's Form 861 data[13] to calculate commercial electricity prices, EIA's Natural Gas Navigator[14] to calculate commercial natural gas prices, and EIA's State Energy Data System (SEDS)[15] to calculate liquefied petroleum gas (LPG) and fuel oil prices. Future energy prices will likely be projected using trends from the EIA's 2013 *Annual Energy Outlook* (*AEO*).[16]

Issue 19: DOE seeks comment on its approach for developing energy prices. DOE seeks input on specific data sources available for collecting tariffs.

[13] Energy Information Administration (EIA), Survey form EIA-861 -- Annual Electric Power Industry Report (Available at: http://www.eia.gov/electricity/data/eia861/index.html) (Last accessed April 15, 2013).
[14] Energy Information Administration (EIA), Natural Gas Navigator (Available at: http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm) (Last accessed April 15, 2013).
[15] Energy Information Administration (EIA), State Energy Data System (SEDS) (Available at: http://www.eia.gov/state/seds/) (Last accessed April 15, 2013).
[16] Energy Information Administration (EIA), 2013 Annual Energy Outlook (AEO) Full Version (Available at: http://www.eia.gov/forecasts/aeo/) (Last accessed April 15, 2013).

Maintenance costs are expenses associated with ensuring continued operation of the covered equipment over time. DOE intends to develop maintenance costs for its analysis using the most recent RS Means data available. DOE plans also to consider the cases when the equipment is covered by service and/or maintenance agreements.

Issue 20: DOE seeks input on the approach and data sources it intends to use to develop maintenance costs, specifically, its intention to use the most recent RS Means Facilities Maintenance & Repair Cost Data,[17] as well as to consider the cost of service and/or maintenance agreements.

Repair costs are expenses associated with repairing or replacing components of the covered equipment that have failed. DOE intends to assess whether repair costs vary with equipment efficiency as part of its analysis.

Issue 21: DOE seeks comment as to whether repair costs vary as a function of equipment efficiency. DOE also requests any data or information on developing repair costs.

Equipment lifetime is the age at which a unit of covered equipment is retired from service. The average equipment lifetime for commercial warm air furnaces is estimated by ASHRAE to be between 15 and 20 years.[18] Based on these data, DOE plans to use a 17.5 average lifetime for commercial warm air furnaces as the primary input for developing a Weibull probability distribution to characterize commercial warm air furnace lifetime.

[17] RS Means, 2013 Facilities Maintenance & Repair Cost Data (Available at: http://rsmeans.reedconstructiondata.com/60303.aspx) (Last accessed April 10, 2013).
[18] American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE), ASHRAE Handbook of HVAC Systems and Equipment (2008) p. 32.8.

Issue 22: DOE seeks comment on its approach of using a Weibull probability distribution to characterize equipment lifetime. DOE also requests any equipment lifetime data or information and whether equipment lifetime varies based on equipment class.

The discount rate is the rate at which future expenditures are discounted to establish their present value. DOE intends to derive the discount rates by estimating the cost of capital of companies that purchase commercial furnace equipment.

DOE measures LCC and PBP impacts of potential standard levels relative to a base case that reflects the likely market in the absence of amended standards. DOE plans to develop market-share efficiency data (*i.e.*, the distribution of equipment shipments by efficiency) for the equipment classes DOE is considering, for the year in which compliance with any amended standards would be required.

DOE also plans to assess the applicability of the "rebound effect" in the energy use analysis for commercial warm air furnaces. A rebound effect occurs when a piece of equipment that is made more efficient is used more intensively, so that the expected energy savings from the efficiency improvement may not fully materialize. However, at this time, DOE is not aware of any information about the rebound effect for this equipment type.

Issue 23: DOE requests data on current efficiency market shares (of shipments) by equipment class, and also similar historic data. In particular, DOE seeks efficiency data for very large equipment.

Issue 24: DOE also requests information on expected trends in efficiency for commercial warm air furnaces over the next five years.

Issue 25: DOE seeks comments and data on the rebound effect that may be associated with more-efficient commercial warm air furnaces.

F. Shipment Analysis

DOE uses shipment projections by equipment class to calculate the national impacts of standards on energy consumption, net present value (NPV), and future manufacturer cash flows.

DOE intends to develop a shipments model for commercial warm air furnace equipment driven by historical shipments data. The accuracy of the shipments model is highly dependent on these historical shipments data, as the data are used not only to build up an equipment stock but also to calibrate the shipments model. If no shipments data are available, DOE plans to consider using 1994 shipments data from the Gas Appliance Manufacturers Association[19] (GAMA) (*i.e.*, 164,300 commercial warm air gas-fired furnace shipments),[20] and applying a trend based on estimated historical commercial warm air furnace stock derived from CBECS data.

Issue 26: DOE seeks historical shipments data for commercial warm air furnaces.

The shipments model will consider three market segments: (1) new commercial buildings acquiring equipment; (2) existing buildings replacing old equipment; and (3) existing buildings

[19] This organization has subsequently become the Air-Conditioing, Heating, and Refrigeration Institute (AHRI).
[20] Pacific Northwest National Laboratory (PNNL), Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment (April 2000) (Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-13232.pdf) (Last accessed April 10, 2013).

acquiring new equipment for the first time. Two stock categories are also considered: (1) equipment that has received only normal maintenance repairs; and (2) equipment that has had its useful life extended through additional repairs. To determine whether a customer would choose to repair rather than replace their commercial furnace equipment, the shipments model explicitly accounts for the combined effects of changes in purchase price, annual operating cost, and the value of commercial floor space on the purchase versus repair decision. Changes to the purchase price and operating costs due to amended energy conservation standards were the drivers for shipment estimates for the standards cases relative to the base case (*i.e.*, the case without amended standards).

Issue 27: DOE requests comment on the approach it intends on using to develop the shipments model and shipments forecasts for this rulemaking.

DOE intends to utilize the U.S. Census Bureau data[21] to establish historical new construction floor space, as well as historical stock floor space. The *Annual Energy Outlook* will be used to forecast both new construction and stock floor space. Together with historical equipment saturation data from CBECS, DOE will estimate shipments to the three market segments identified above. The utility function to estimate the repair versus replacement decision will be based on income per square foot data from the Building Owners and Managers

[21] U.S. Census Bureau, Statistical Abstract of the United States: 2011, Table No 933 - Construction Contracts-Value of Construction and Floor Space of Buildings by Class of Construction (Available at: https://www.census.gov/compendia/statab/2011/cats/construction_housing/construction_indices_and_value.html) (Last accessed April 10, 2013).

Association (BOMA) Commercial Building Survey reports,[22] purchase price data estimated from the Bureau of Labor Statistics,[23] and operating cost data derived from the LCC and PBP analysis.

Issue 28: DOE seeks input on the approach and data sources it intends to use in developing the shipments model and shipments forecasts for this analysis.

G. National Impact Analysis

The purpose of the national impact analysis (NIA) is to estimate aggregate impacts of potential energy conservation standards at the national level. Impacts that DOE reports include the national energy savings (NES) from potential standards and the net present value (NPV) of the total consumer benefits.

To develop the NES, DOE calculates annual energy consumption for the base case and the standards cases. DOE calculates the annual energy consumption using per-unit annual energy use data multiplied by projected shipments.

To develop the national NPV of consumer benefits from potential energy conservation standards, DOE calculates annual energy expenditures and annual equipment expenditures for the base case and the standards cases. DOE calculates annual energy expenditures from annual energy consumption by incorporating forecasted energy prices, using shipment projections and average energy efficiency projections. DOE calculates annual equipment expenditures by

[22] Building Owners and Managers Association International (BOMA). Experience Exchange Report (2013) (Available at: https://www.bomaeer.com/) (Last accessed April 10, 2013).
[23] U.S. Department of Labor, Bureau of Labor Statistics. Producers Price Index: Industry: Refrigeration and Heating Equipment (Available at: http://www.bls.gov/ppi/home.htm) (Last accessed April 10, 2013).

multiplying the price per unit times the projected shipments. The difference each year between energy bill savings and increased equipment expenditures is the net savings or net costs.

A key component of DOE's estimates of NES and NPV are the equipment energy efficiencies forecasted over time for the base case and for each of the standards cases. To develop the various standards cases, DOE plans to develop market-share efficiency data (*i.e.*, data on the distribution of equipment shipments by efficiency) for the commercial furnace equipment classes DOE is considering. To estimate the impact that amended energy conservation standards may have in the year compliance becomes required, DOE has used "roll-up" and/or "shift" scenarios in its standards rulemakings. Under the "roll-up" scenario, DOE assumes: (1) equipment efficiencies in the base case that do not meet the new or amended standard level under consideration would "roll up" to meet that standard level; and (2) equipment shipments at efficiencies above the standard level under consideration would not be affected. Under the "shift" scenario, DOE retains the pattern of the base-case efficiency distribution but re-orients the distribution at and above the new or amended minimum energy conservation standard. After DOE establishes the average efficiency for the assumed compliance date of a standard, it can estimate future efficiency by using the same rate of projected efficiency growth as for the base-case efficiency trend.

DOE intends to determine whether there is a rebound effect associated with more efficient commercial furnaces. If data indicate that there is a rebound effect, DOE will account for the rebound effect in its calculation of NES.

DOE has historically presented NES in terms of primary energy savings. On August 18, 2011, DOE published a final statement of policy in the Federal Register announcing its intention

to use full-fuel-cycle (FFC) measures of energy use and greenhouse gas and other emissions in the national impact analyses and emissions analyses included in future energy conservation standards rulemakings. 76 FR 51281. While DOE stated in that notice that it intended to use the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model to conduct the analysis, it also said it would review alternative methods, including the use of NEMS. After evaluating both models and the approaches discussed in the August 18, 2011 notice, DOE published an amended statement of policy, articulating its determination that NEMS is a more appropriate tool for this purpose. 77 FR 49701 (Aug. 17, 2012). Therefore, DOE intends to use the NEMS model to conduct FFC analyses. The method used to derive the FFC multipliers will be described in the technical support document (TSD).

Issue 29: In addition to historical efficiency data, DOE also requests information on expected trends in efficiency of commercial warm air furnaces over the long run.

Issue 30: DOE requests comment on whether it should pursue a roll-up or shift approach for potential commercial warm air furnace standards in the national impact analysis.

III. Public Participation

DOE invites all interested parties to submit in writing by **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, comments and information on matters addressed in this notice and on any other matters relevant to DOE's consideration of potential amended energy conservation standards for commercial warm air furnaces.

After the close of the comment period, DOE will begin collecting data, conducting the analyses, and reviewing the public comments. These actions will be taken to aid in the development of a notice of proposed rulemaking (NOPR) for commercial warm air furnaces, if DOE determines that the statutory criteria have been met for amended energy conservation standards for such equipment.

Instructions: All submissions received must include the agency name and docket number and/or RIN for this rulemaking. No telefacsimilies (faxes) will be accepted.

Docket: The docket is available for review at www.regulations.gov, including Federal Register notices, public meeting attendees' lists and transcripts, comments, and other supporting documents/materials. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket webpage can be found at: http://www.regulations.gov/#!docketDetail;D=EERE-2013-BT-STD-0021. This webpage contains a link to the docket for this notice on the www.regulations.gov website. The www.regulations.gov webpage contains simple instructions on how to access all documents, including public comments, in the docket.

For information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact Ms. Brenda Edwards at (202) 586-2945 or by e-mail: Brenda.Edwards@ee.doe.gov.

DOE considers public participation to be a very important part of the process for amending energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of the rulemaking process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the rulemaking process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this rulemaking should contact Ms. Brenda Edwards at (202) 586–2945, or via e-mail at Brenda.Edwards@ee.doe.gov.

Issued in Washington, DC, on April 26, 2013.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy

[FR Doc. 2013-10388 Filed 05/01/2013 at 8:45 am;
Publication Date: 05/02/2013]